ON THE EVOLUTION AND DEVELOPMENT OF COLLAGEN

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Collagen was prepared from about twenty species from different phyloe and its structural organization studied on primary, secondary, tertiary and quaternary levels. From optical rotatory dispersion values it was concluded that the amount of helix is the same in collagens of all the species. However, in the primary structure there were differences in the amino acid composition, correlating with the distance to the common ancestor. Glycine comprised constantly one third of the total amino acid residues and hydroxyamino acids about one sixth. During evolution there seems to be a differentiation of the peptide chains: instead of one type of α-chain in collagens of the invertebrates and cyclostomes there are three divergent α-chains in collagens of the higher vertebrates. The thermal stability of collagen is lowest in fishes as evidenced by the thermal shrinking point, denaturation of dissolved collagen, solubility in acid buffers and gelatinization at various heat-treatments.

Collagen in young mammals resembles that of fishes in regard to solubility, both in acid buffers and at heating. The age of the mammals is reflected also in the fractionation patterns of mildly gelatinized collagen in Amberlite-CG 50 column chromatography with pH and ionic strength gradient elution.